

Abstract of the Disclosure

An apparatus and method for transmitting and receiving signals using multi-antennas are disclosed. The signal transmitting apparatus for transmitting signals to a plurality of receiving apparatuses, using multi-antennas, includes: a  $\mathbf{V}$  generator which generates a beamforming matrix  $\mathbf{V}$  for a predetermined channel; a water filling unit which does not perform water filling for a training signal that is pre-known by the receiving apparatuses, and performs water filling for a user signal to be transmitted by using the  $\mathbf{V}$  matrix and predetermined control values; a  $\mathbf{V}$  operation unit, which multiplies a signal output from the water filling unit by the  $\mathbf{V}$  matrix and transmits the multiplied result through the multi-antennas; and a control value detector, which extracts the control values from signals received from the receiving apparatuses through the multi-antennas, and outputs a maximum value among the extracted values to the water filling unit.